



# A PROFILE OF TUTICORIN RESEARCH CENTRE OF CENTRAL MARINE FISHERIES RESEARCH INSTITUTE (INDIAN COUNCIL OF AGRICULTURAL RESEARCH)



South Beach Road, Tuticorin - 628 001, Tamilnadu, India.

# Tuticorin Research Centre of Central Marine Fisheries Research Institute



The Central Marine Fisheries Research Institute (CMFRI) with Head Quarters at Kochi is the multidisciplinary fisheries research institute under the Indian Council of Agricultural Research (ICAR), New Delhi. The CMFRI, which celebrated the Diamond Jubilee year in 2007, grew significantly in size and stature during the last sixty years by establishing 3 Regional Centres, 7 Research Centres and 15 Field Centres, building up adequate infrastructures and technically competent scientific manpower. The marine ecosystem of Gulf of Mannar is unique

and has supported a traditional pearl and chank fishery which has earned income to the Government for several centuries. Realizing the need to give proper impetus for the development of marine fisheries of the area, Tuticorin Research Centre of CMFRI was started as a 'Survey Centre' in 1948 and was upgraded as 'Research Unit' in 1959. With further strengthening of the research activities, this was elevated to the status of a 'Sub-station' in 1969 and subsequently to a 'Research Centre' in 1975. The centre has made several unique and valuable research contributions during the last six decades which has won national and international recognition.

## Research Facilities

The centre has the necessary scientific infrastructure facilities to carry out basic fisheries and mariculture research. In addition to library, vehicles and internet the centre has the following specific infrastructure.

- A well equipped shellfish hatchery with facilities for seawater intake, purification, broodstock conditioning, spawning and larval rearing.



- A micro-algal laboratory with 12 species of stock cultures of commercially important algae with daily mass culture production capacity of 180 l at a concentration of 2 million cells per ml
- Fishery biology and hydrology laboratories with AAS, spectrophotometer, sampling equipments, microscopes and digital measuring apparatuses
- A marine tissue culture laboratory with water purifiers, automatic autoclaves, water bath, ultracentrifuge, CO<sub>2</sub> incubator, inverted microscope, laminar flow and other essential equipments
- Zooplankton culture laboratory for fin fish larval rearing.
- Underwater diving (SCUBA) apparatuses, Echo sounder, Sonar and underwater cameras and video camera and softwares for map generation.
- A 42' Research Vessel with facilities for seawater collection and assessing the state of hydro biological conditions of the sea.



## Underwater Explorations

One of the foremost contributions of the centre is the underwater exploration of Gulf of Mannar and Palk Bay. With training from Dr Salvadori, FAO expert on SCUBA, (Self Contained Underwater Breathing Apparatus), the research staff explored the famous pearl banks (paars) and chank beds for nearly a decade from 1958 and the underwater photographs of these natural wonders were published. These were the first visual proofs of the enchanting behaviour of the marine fauna of the area, which was first of its kind in the entire nation.



Survey of the 21 islands in the Gulf of Mannar was rewarding and helped the Government to declare these islands as National Marine Park. The legacy was carried on during the succeeding decades also. The centre now conducts underwater studies to assess coral/pearl beds, support environmental impact assessment programs and study the impact of Artificial Reefs/ Fish Aggregating Devices (FAD) with underwater cameras and videos. Currently the centre is studying the status of the pearl beds off Tuticorin with the fundings of MoEF.





### Nation's first cultured marine pearl

The nation's first cultured marine pearl was produced here in 1973 and this was acknowledged as research par excellence. Over the years, the techniques were refined and the success rates were improved. Preliminary success was also obtained in colour manipulation of the culture pearl.

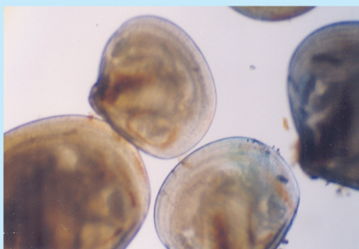


### Mariculture technology development

The centre has been in the forefront in mariculture technology development in India. The farming techniques for pearl oyster, edible oyster, prawns, crabs, and fin fishes were developed. Advanced research was carried out on formulation of microencapsulated diets and development of live feed culture. Incidentally, the edible oyster farming which

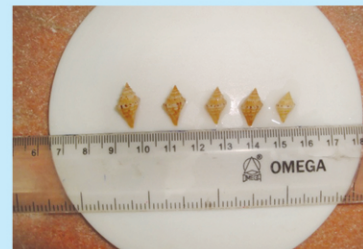


is implemented as a rural development program in Kerala through which nearly 4-5000 families are earning an additional source of income was first developed at Tuticorin Research Centre. The current farmed oyster production is more than 10000 t and India is one among the top ten Asian countries in edible oyster production. Experimental prawn culture in salt pan ponds carried out during 1988-'89 led to fast development of semi-intensive prawn culture along Southeast coast line.



### Molluscan Hatchery

The need for development of seed production technology was comprehended and a full fledged molluscan hatchery was set up during 1982. From this hatchery several million pearl oyster seed have been produced and supplied to commercial ventures and research programs of maritime states and Union



Territories. Seed of bivalves like *Meretrix casta*, *M. meretrix*, *Paphia malabarica*, *Marcia opima*, *Anadara granosa* and *Placenta placenta* were produced over the years. During the last few years technologies for remote setting were also developed in collaboration with scientists and oyster farmers along the west coast. Seed of cephalopods such as *Sepiella inermis*, *Sepioteuthis lessoniana* and *Sepia pharaonis* were produced. Few generations of *S. inermis* were produced. The centre is now focusing on the development of technology for seed production of major groups of ornamental marine gastropods such as Muricids, Strombids and Cyprids.





## Biotechnology Programs

A marine tissue culture lab was set up in 1996 and research program was supported by Department of Biotechnology and National Agricultural Technology Project (NATP). Through concerted efforts by the researchers of the centre the preliminary success was obtained in pearl production through tissue culture of the abalone, *Haliotis varia*. This technique which is a global first and has won international recognition and is patented. The centre has also been able to produce triploidy in edible oysters. Recently preliminary success is achieved in visible nacre coating on beads which will pave way for pearl production.



## Conservation

The centre has given support to revive the threatened or depleting valuable resources of Gulf of Mannar. The sea cucumbers (bech-de-mer) were once fished regularly from the Tuticorin waters. Overexploitation lead to a ban on fishing and the resource is now considered endangered. The centre has studied this



valuable resource and the hatchery techniques for the sea cucumbers *Holothuria scabra* and *H. spinifera* were developed and several thousand seed produced at the centre were sea ranched.

Seahorses are another group which are over exploited. The centre has succeeded in the breeding and rearing of this resource upto four generations (F-4).

Using the larvae and spat produced in the hatchery, attempts were made to enhance the depleted stock to repopulate the sparse pearl oyster beds of Gulf of Mannar and Palk Bay. Seed of clams, edible oysters and cuttle fishes were produced and ranched.



## Monitoring of the exploited fish stocks and Creation of Database.

The marine fisheries scenario along the Tuticorin coast is also vibrant. The present catch (2014) was estimated to be 86,538 t with contributions from trawlers and traditional gears. From this centre, the biological and population parameters of important pelagic, demersal,



crustacean and molluscan resources of Tuticorin, Tirunelveli and Kanyakumari districts are being studied. Efforts are on to build a mass balance trophic model of Gulf of Mannar using the ECOPATH Software based on diet composition, food consumption, biomass and mortality of selected functional groups.



Earlier studies were also done on the tagging and recapture of sacred chank to understand its migration and growth. Considerable amount of attention was also paid towards monitoring and conservation of marine mammals in collaboration with the Department of Forest and Wildlife under Gulf of Mannar National Marine Park. On consolidation of 50 years data on demersal fisheries indicated the phased growth of this fisheries over these years. While studying the fish stock the specific reasons for fluctuations are found out.

### Biodiversity Programs

The centre handles a major program on studying the biodiversity of Gulf of Mannar and has identified more than 800 fishes belonging to 72 families. A complete data base of 434 species of marine organisms which includes commercial fin fishes and shell fishes has been generated. Nomenclatural issues of some fishes were sorted out and a repository of marine fauna & flora is maintained, consisting of fishes, corals, sponges, echinoderms, seaweeds and seagrasses.



### Environment Monitoring

The hydrological parameters of the Gulf of Mannar have been closely monitored over the years. The state of health of coastal waters in relation to pollution has also been studied. Through a NATP the Coral Reef Ecosystem of Van and Koswar Islands of Gulf of Mannar were studied. The Koswar Reef was found to have live corals such as



*Acropora*, *Favia*, *Platygyra*, *Turbinaria* and *Goniastrea*. Currently the centre focusses on domestic and industrial effluents and their effect on marine environment, effect of temperature change on the phyto and zooplankton and heavy metal pollution and beach litter apart from studying the sea bird population of these coast.

### Consultancy Services

Through the scientific expertise of the research staff of the centre and with the facilities available, the centre has offered consultancy services on underwater surveys, inspection of submarine effluent pipelines, living resources of Gulf of Mannar and Palk Bay and pearl culture.



Some of our prominent clients were National Environmental Engineering Research Institute (NEERI), Nagpur, for Initial Environment Examination (IEE) for the Sethu Samudram Ship Canal project; Mangalore Refinery and Petro Chemicals Ltd. (MRPL) Mangalore; M/s Bharat Heavy Electrical Ltd (BHEL) Tiruchi; M/s Indian Agro Products Ltd., Tuticorin; Balaji Bio-tech, Ltd, Nellore; N.C.C.Bluewater, AP; Gem Hatchery, Chennai; Tamil Nadu Fisheries Department and SPIC, Tuticorin. The centre has also been supplying algal culture inocula which form the base for larval feed to commercial hatcheries, Universities and other private Institutes.

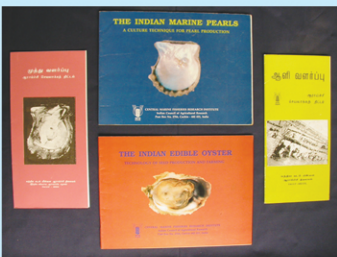


### Training Programs and Extension Activities

The centre has been regularly conducting short-term and long-term training programs on pearl oyster farming and pearl production, hatchery techniques, bivalve farming and SCUBA diving. In 1991, this centre was the venue for the training program on pearl culture under the FAO/UNDP/NACA project on sea



farming in which 26 trainees from nine south-east Asian countries participated. Apart from this, staff of several state government departments has been trained in various aspects of Aquaculture and Fisheries from the centre. The centre has also offered training to women self help groups and coastal villagers on pearl culture. During the Tsumani of 2004, a rapid survey in all the villages of the three districts viz Tuticorin, Tirunelveli and Kanyakumari, was conducted to study the impact of this natural disaster. Besides a survey on 'National Marine Census', 2010 was also carried out in these districts. Recently in 2012 the centre has conducted demonstration, training and transfer of pearl culture technology to two coastal villages of Tuticorin i.e Sipikulam and Keelavaipar with MoES funding.



### Publications

Through research investigations, several international publications, research bulletins, scientific and popular articles, brochures and training manuals have been published. The centre has also supported advanced research by scholars leading to Ph.D., degree in marine science/ mariculture.

## Future Thrusts

- Building a multi-species stock assessment modeling for Tamil Nadu based on ecosystem approach to fisheries management
- Cataloguing and documentation of the finfish biodiversity of Gulf of Mannar biosphere
- Development of complete package of technology for pearl production through tissue culture
- Development of hatchery techniques for high valued and threatened ornamental molluscs
- Large scale juvenile cephalopod production under hatchery and ranching
- Conservation and stock enhancement of sea cucumbers through collaborative programs
- Formulation of guidelines for reducing the impact of marine environmental contaminants in Tuticorin coastal waters
- Commercialization of pearl culture with Self Help Groups and coastal villagers as major beneficiaries
- Development of management advisories for long term sustainable utilization of marine fisheries along Tamil Nadu coast
- Deployment of artificial reefs along the selected coastal villages of Gulf of Mannar as a community programme
- Advocating Cage culture of fin fishes and shellfishes on a fishermen - researcher interface.

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